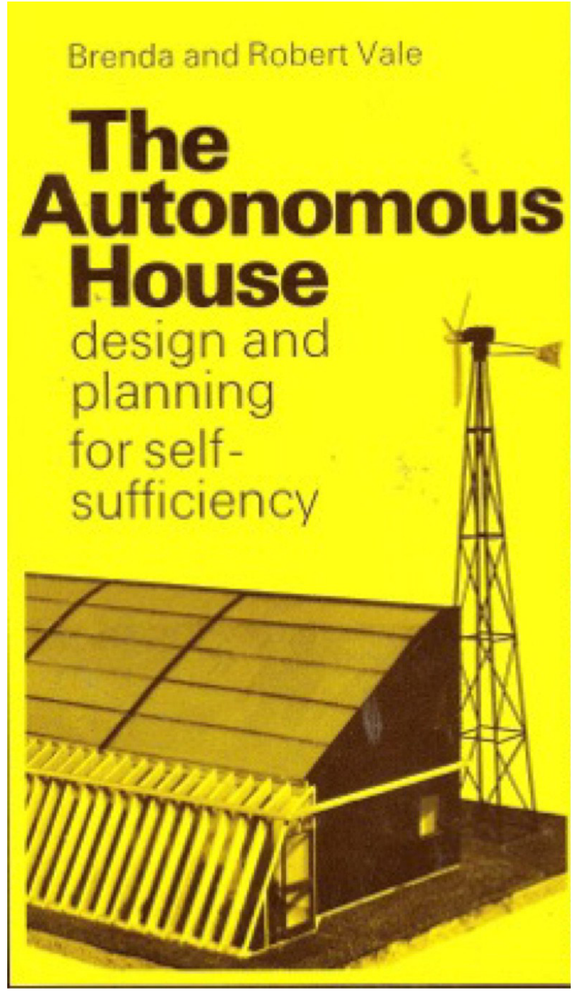
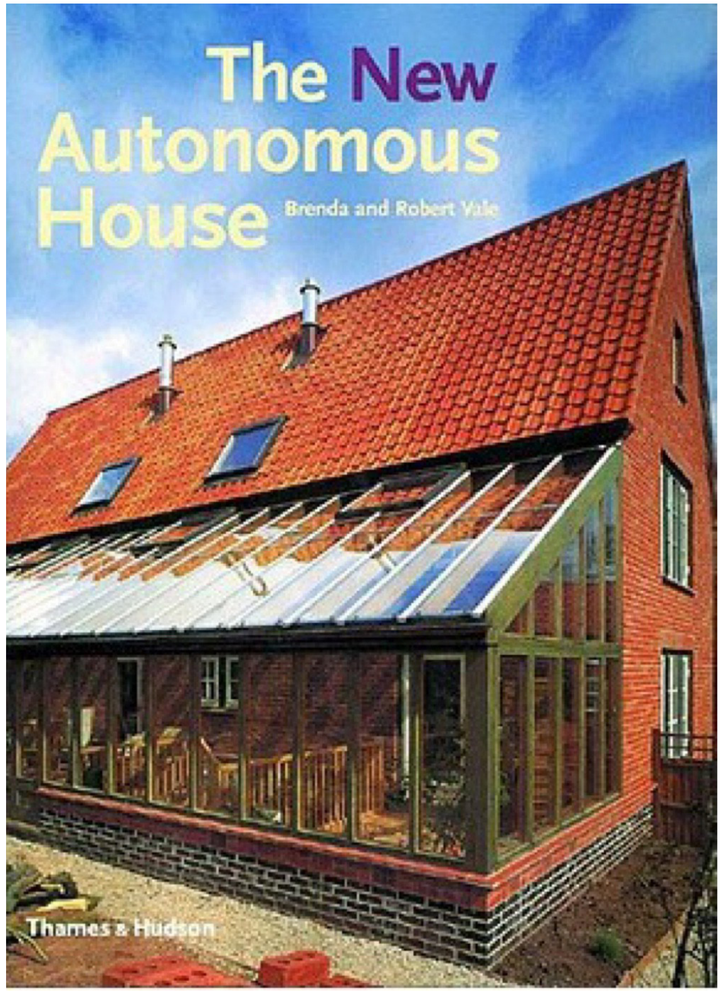
Mole


Brenda and Robert Vale
The Autonomous House
design and planning for self-sufficiency

1975


The New Autonomous House
Brenda and Robert Vale
Thames & Hudson

2000

The Black House 2002 (where I live)

- Prefabricated timber frame
- Low embodied energy
- Recycled materials
- Shading devices
- ASHP
- MVHR

Calculated primary energy
140 kWh/m2/year

Calculated heat loss
38 kWh/m2/year

(Current B Regs house
calculated heat loss
55 kWh/m2/year)

Affordable Passivhaus 2009 Norfolk

- Prefabricated timber frame
- Shading devices
- Triple glazing
- No heating system
- MVHR

Calculated primary energy
60 kWh/m2/year

Calculated heat loss
12 kWh/m2/year

(Current B Regs house
calculated heat loss
55 kWh/m2/year)

Eddington 2012

- Code Level 5

-Low energy use
- High thermal mass
- Triple glazing
- District heating
- High natural light levels

(Current B Regs house
calculated heat loss
55 kWh/m2/year)

Marmalade Lane 2018

Land sale of City owned land
Tender requirement to build to high environmental standard

- Prefabricated timber frame
- Low embodied energy
- CLT Frame
- Triple glazing
- ASHP
- MVHR

Calculated primary energy
90 kWh/m2/year

Calculated heat loss
17 kWh/m2/year

(Current B Regs house calculated heat loss
55 kWh/m2/year)

Cambridge City Council

Land sale of City owned land

Tender requirement to build to high environmental standard

Hill Residential scheme with Pollard Thomas Edwards Architects

- zero carbon to Passivhaus standards

Norwich City Council

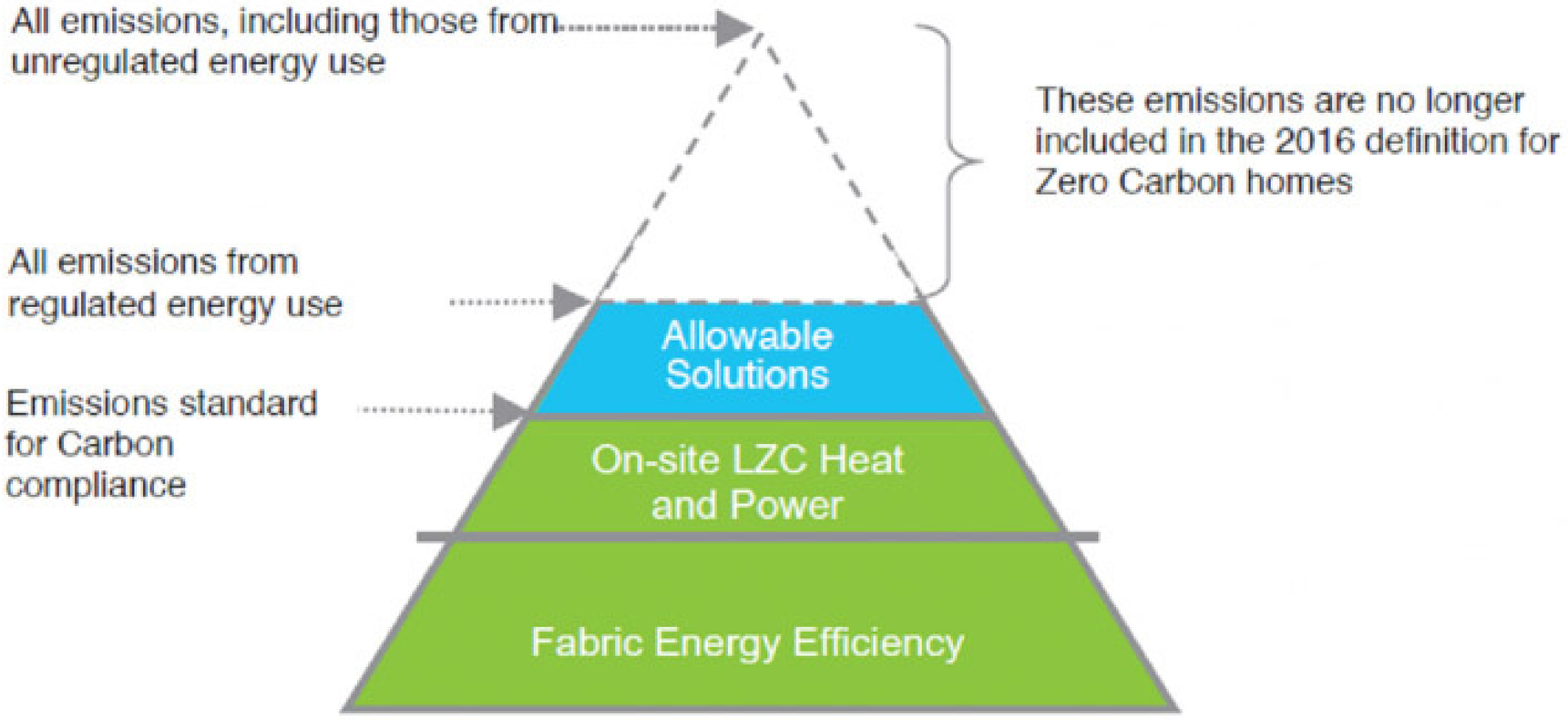
Development of City owned land

100% houses for social rent

Designed by Mikhail Riches Architects to Passivhaus standards

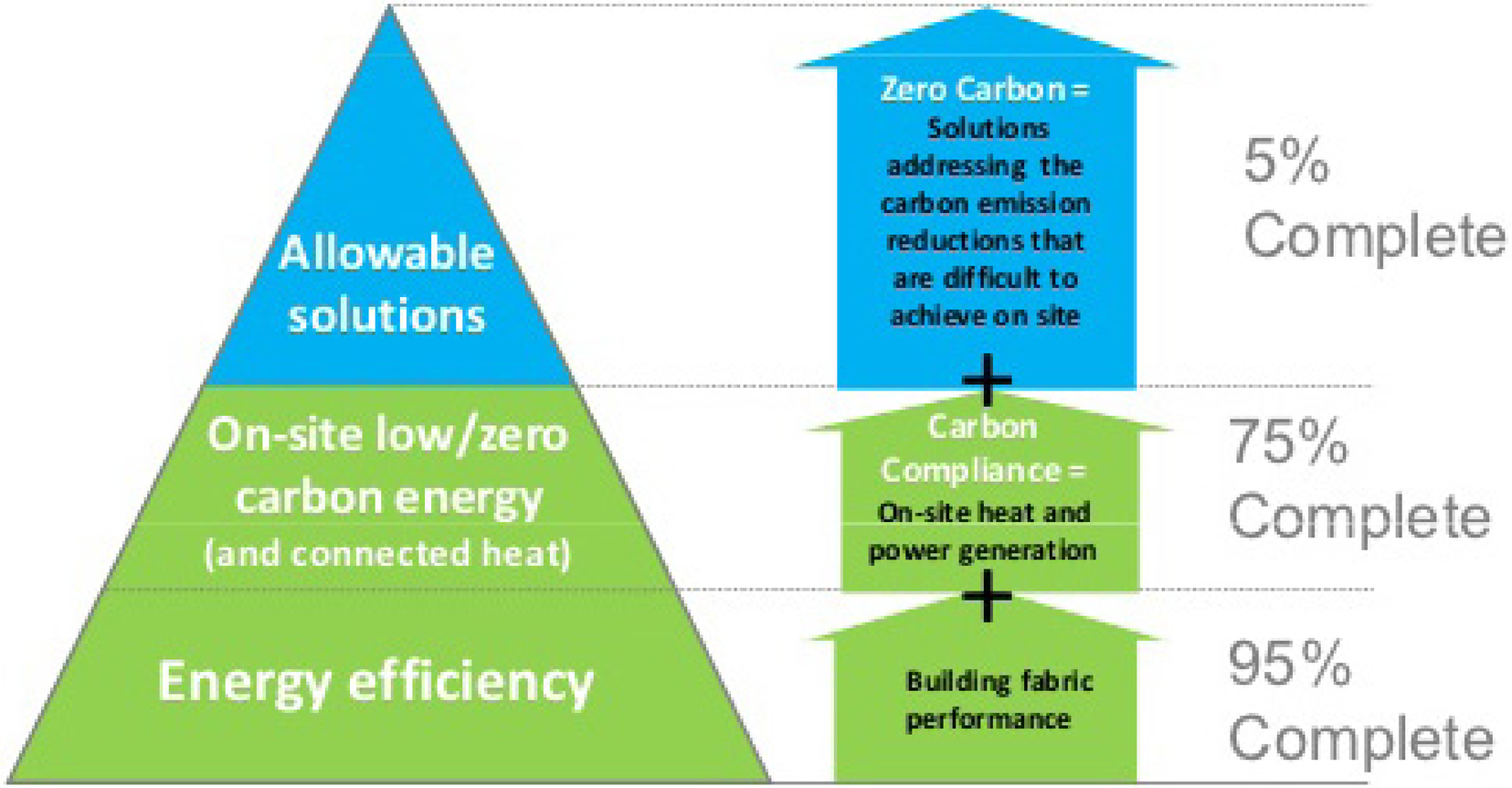
Shortlisted for the 2019 RIBA Stirling Prize

Near Zero Carbon

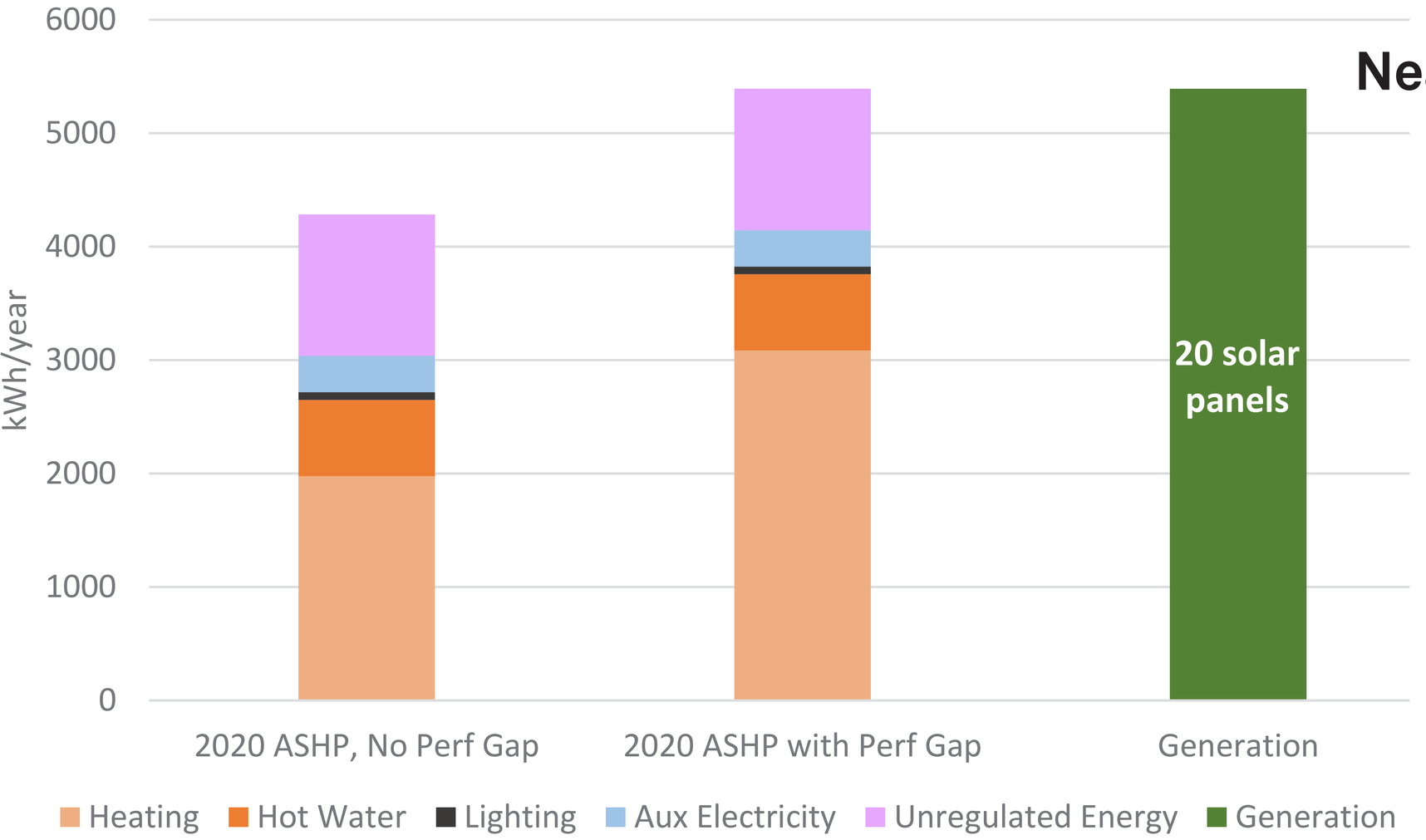


*** source:**
Zero Carbon Hub/ Tom Dollard PTEa

Near Zero Carbon



* source:
Zero Carbon Hub/ Tom Dollard PTEa



Near Zero Carbon

*** source:**
Passivhaus Trust
Route to Zero Carbon

Northstowe
10,000

Waterbeach (U+C)
6,500

16,500 total

Waterbeach (Turnstone)
4,500

Alconbury
7,000

28,000 total

Wing
1,300

Marshalls
12,000

41,300 total

Eddington
3,000

Cambourne West
2,350

46,550 total

Bourne
3,500

North Ely
3,000

53,050 total

Wintringham
2,800

Darwin Green
1,600

57,450 total

Welcome Trust

1,500

58,950 total

Barratt	£38K
Taylor Wimpey	£54K
Persimmon	£50K
Bellway	£56K
Berkeley	£119K
Redrow	£55K
Galliford Try	£44K
Bovis	£40K
Crest Nicholson	£70K
L&Q	£45K
Countryside	£46K
Bloor	£44K

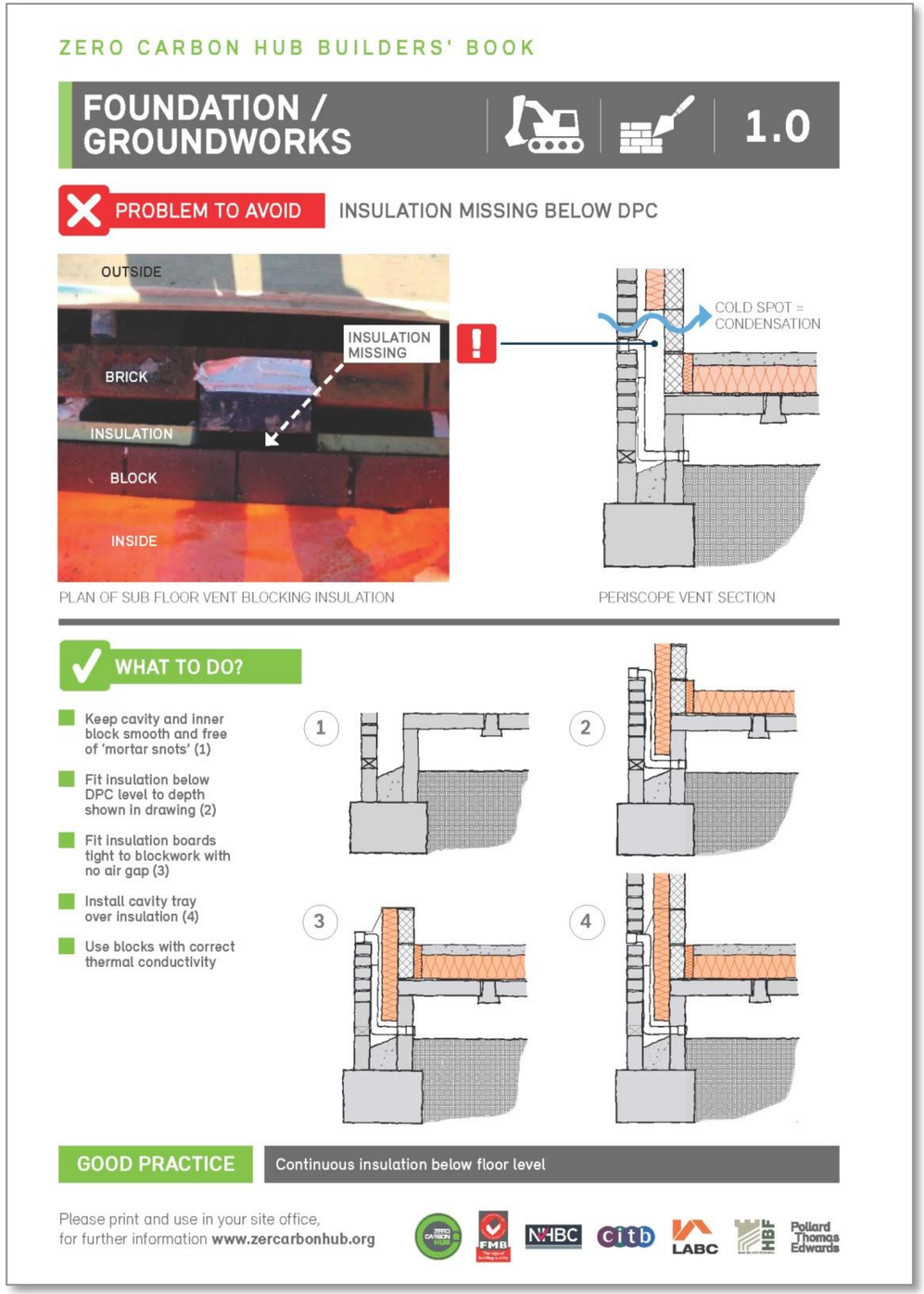
Regulatory
Minimum requirements

Cambridge	(**19%** reduction on 2013)
Greater Manchester (Emerging)	**19%** reduction on Part L 2013 20% carbon reduction from renewables 'Zero carbon' from 2028
Guildford (Emerging)	**20%** reduction on Part L 2013
Eastleigh (Emerging)	**19%** reduction on Part L 2013
Oxford (Emerging)	**19%** reduction on Part L 2013 (adopted) **40%** reduction on Part L 2013 (emerging) 50% reduction from 2026 'Zero Carbon' from 2030

*** source:**
Richard Twinn
Green Building Council

Cambridge	(**19%** reduction on 2013)	**Target Fabric Energy Efficiency (FEE) Part L 2013**
Greater Manchester (Emerging)	**19%** reduction on Part L 2013 20% carbon reduction from renewables 'Zero carbon' from 2028	**55 kWh/m2/year**
Guildford (Emerging)	**20%** reduction on Part L 2013	**a 19% reduction = 44 kWh/m2/yr (The Black House = 38kWh/m2/yr)**
Eastleigh (Emerging)	**19%** reduction on Part L 2013	
Oxford (Emerging)	**19%** reduction on Part L 2013 (adopted) **40%** reduction on Part L 2013 (emerging) 50% reduction from 2026 'Zero Carbon' from 2030	**a 40% reduction = 32 kWh/m2/yr** **Passivhaus 15 kWh/m2/yr**

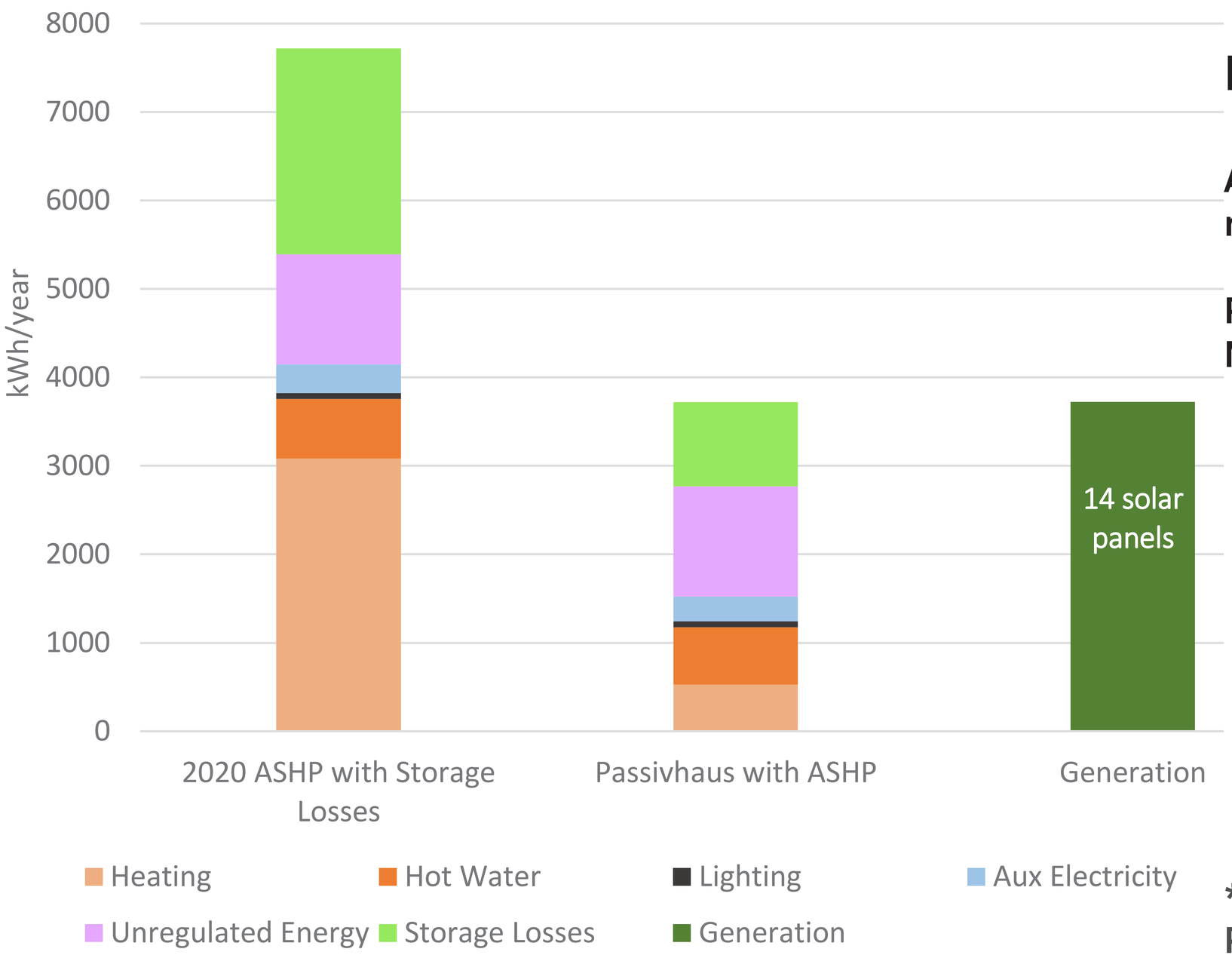
BuildingsRegulations Minimum requirements



Performance Gap

60%-120% variation from design calculations:

gaps in assemblies
poor design- cold bridging
incorrect products
not airtight
discontinuous insulation
poor window installation



Performance Gap

Air permeability allowed max 10 m3/m2 @ 50 pa

Passivhaus requires Max 0.6 m3/m2 @ 50 pa

*** source: Passivhaus Trust Route to Zero Carbon**

Performance Gap

Larch House
Bere:architects

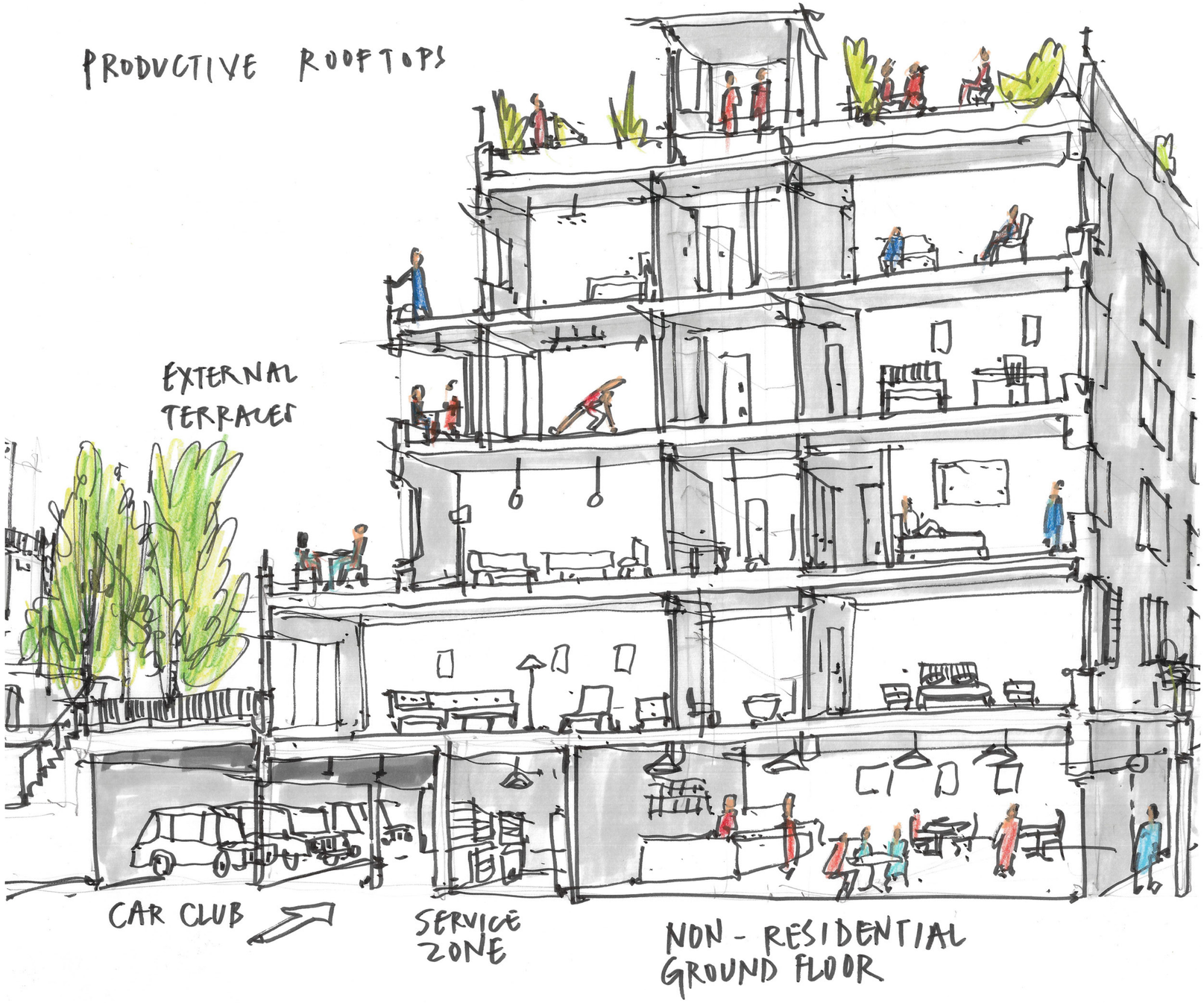
Transport links

Million tonnes of oil equivalent

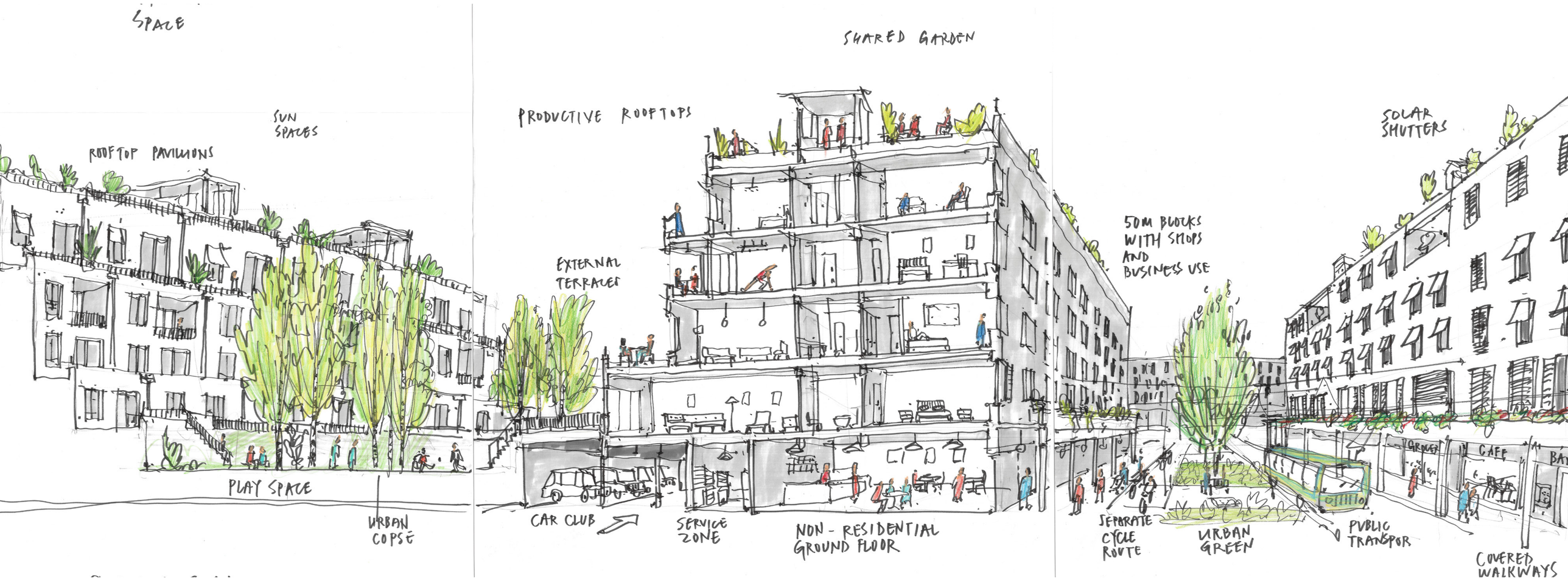
	1990	2000	2010	2016	2017
Total inland primary energy consumption[1]:	213.6	234.8	219.5	194.5	192.1
Conversion losses:		53.8	50.3	37.4	35.8
Distribution losses	66.4				
and energy industry use:		20.7	18.0	15.0	15.0
Total final energy consumption:	147.3	159.4	150.5	142.2	141.2
Final consumption of which:					
Industry	38.7	35.5	27.0	23.7	24.1
Domestic sector	40.8	46.9	49.4	41.7	40.1
Transport	48.6	55.5	54.6	56.0	56.5
Services[2]	19.2	21.5	19.4	20.8	20.5
Temperature corrected total inland consumption:	221.6	240.2	213.7	195.7	195.2

* source:
Dept for Business, Energy & Industrial Strategy 2018


SOLAR SHUTTERS
50M BLOCKS WITH SHOPS AND BUSINESS USE
GROCERY
CAFE
SEPARATE CYCLE ROUTE
URBAN GREEN
PUBLIC TRANSPOR
COVERED WALKWAY


PRODUCTIVE ROOFTOPS
EXTERNAL TERRACES
CAR CLUB
SERVICE ZONE
NON - RESIDENTIAL GROUND FLOOR


ROOFTOP PAVILIONS
PLAY SPACE
URBAN COPSE


SPACE
SUN SPACES
ROOFTOP PAVILIONS
PLAY SPACE
URBAN COPSE
SHARED GARDEN
PRODUCTIVE ROOFTOPS
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GROCER
CAFE
COVERED WALKWAYS

Mole